Experiment No: 05

Experiment Name: Implementation of OSPF with Subnetting using Router CLI.

Theory:

Subnetting divides a large IP network into smaller subnets, each with its own network ID and host range. This improves IP address utilization, reduces broadcast traffic, and enhances performance and security. Router connect different subnets, while switches operate within a single subnet.

In this experiment, subnetting is applied and **OSPF (Open Shortest Path First)** is configured to enable dynamic routing between routers. OSPF automatically exchanges routing information and calculates the best path using the link-state algorithm.

Components:

1. Cisco Packet Tracer
2. PCs / Laptops
3. PT-Switches
4. PT-Routers
5. Connection cables

Procedure:

Task: Multi-Router Network using OSPF (Dynamic Routing)

Step 1: Device Placement and Connections

1. Open Cisco Packet Tracer.
2. Place the following devices:
   - 3 Routers (RW1, RW2, RW3)
   - 3 Switches
   - 9 PCs (3 per LAN)
3. Connect the devices:
   - PCs → Switches → Routers (using Fast Ethernet cables).
   - Routers interconnected via Serial DCE/DTE cables.

Network Topology Overview:

Router	LAN Network	Serial Connection to	Serial Network
RW1	192.168.0.0/24	RW2	192.168.3.0/24
RW2	192.168.1.0/24	RW3	192.168.4.0/24
RW3	192.168.2.0/24	RW1	192.168.5.0/24

Step 2: IP Address Assignment

Router 1 (RW1)
en
conf t
int fa0/0
ip add 192.168.0.1 255.255.255.0
no shut
exit
int se2/0
ip add 192.168.3.1 255.255.255.0
no shut
exit
int se3/0
ip add 192.168.4.1 255.255.255.0
no shut
exit

Router 2 (RW2)
en
conf t
int fa0/0
ip add 192.168.1.1 255.255.255.0
no shut
exit
int se2/0
ip add 192.168.3.2 255.255.255.0
no shut
exit
int se3/0
ip add 192.168.5.2 255.255.255.0
no shut
exit

Router 3 (RW3)
en
conf t
int fa0/0
ip add 192.168.2.1 255.255.255.0
no shut
exit
int se2/0
ip add 192.168.5.1 255.255.255.0
no shut
exit
int se3/0
ip add 192.168.4.2 255.255.255.0
no shut
exit

Step 3: Configure OSPF on All Routers

Router 1 (RW1)
router ospf 1
network 192.168.0.0 0.0.0.255 area 0
network 192.168.3.0 0.0.0.255 area 0
network 192.168.4.0 0.0.0.255 area 0
exit

Router 2 (RW2)
router ospf 1
network 192.168.1.0 0.0.0.255 area 0
network 192.168.3.0 0.0.0.255 area 0
network 192.168.5.0 0.0.0.255 area 0
exit

Router 3 (RW3)
router ospf 1
network 192.168.2.0 0.0.0.255 area 0
network 192.168.4.0 0.0.0.255 area 0
network 192.168.5.0 0.0.0.255 area 0
exit

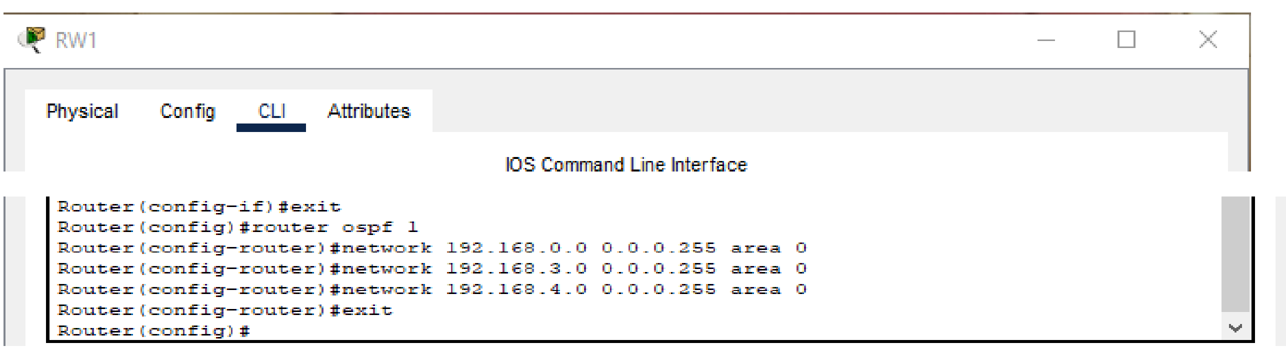

Figure 01: Router 1(RW1) Value Input by CLI.

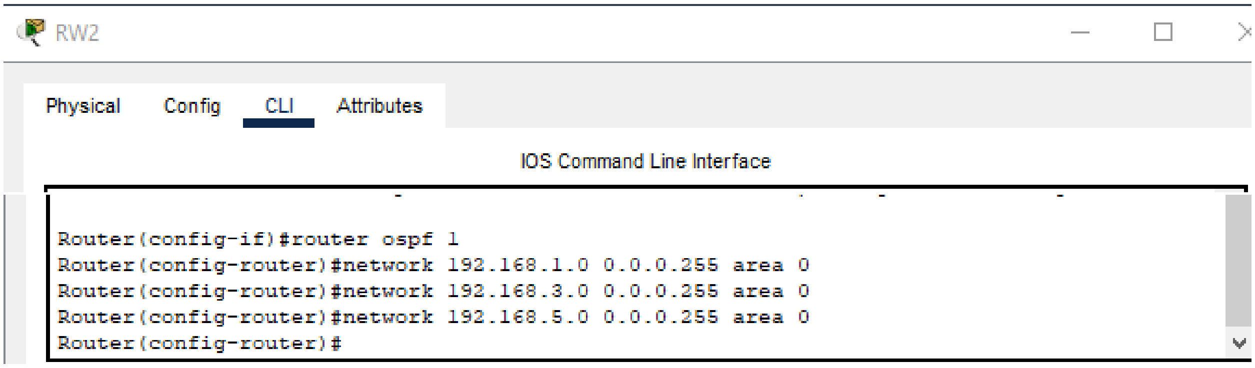

Figure 02: Router 2(RW2) Value Input by CLI.

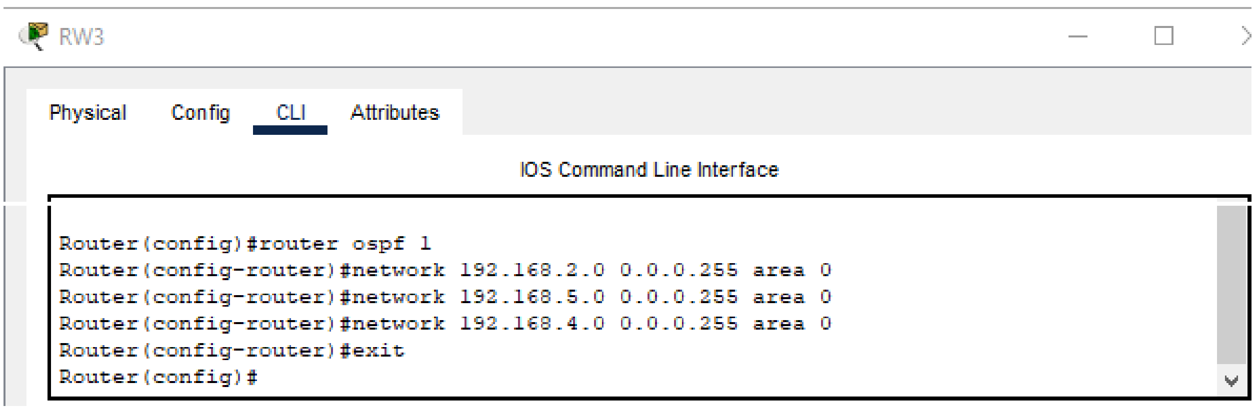

Figure 01: Router 3(RW3) Value Input by CLI.

Step 4: Assign IPs to PCs

LAN	PC	IP Address	Subnet Mask	Default Gateway
LAN A (RW1)	PC1	192.168.0.2	255.255.255.0	192.168.0.1
	PC2	192.168.0.3	255.255.255.0	192.168.0.1
	PC3	192.168.0.4	255.255.255.0	192.168.0.1
LAN B (RW2)	PC4	192.168.1.2	255.255.255.0	192.168.1.1
	PC5	192.168.1.3	255.255.255.0	192.168.1.1

LAN	PC	IP Address	Subnet Mask	Default Gateway
	PC6	192.168.1.4	255.255.255.0	192.168.1.1
LAN C (RW3)	PC7	192.168.2.2	255.255.255.0	192.168.2.1
	PC8	192.168.2.3	255.255.255.0	192.168.2.1
	PC9	192.168.2.4	255.255.255.0	192.168.2.1

Step 5: Testing

Ping Tests

PC1 ↔ PC2 ↔ PC3 → same LAN → success

PC4 ↔ PC5↔ PC6 → same LAN → success

PC7 ↔ PC8↔ PC9 → same LAN → success

PC1 (192.168.0.2) → PC6 (192.168.2.4) → success (via OSPF dynamic routing)

If all pings are successful, OSPF routing is functioning correctly.

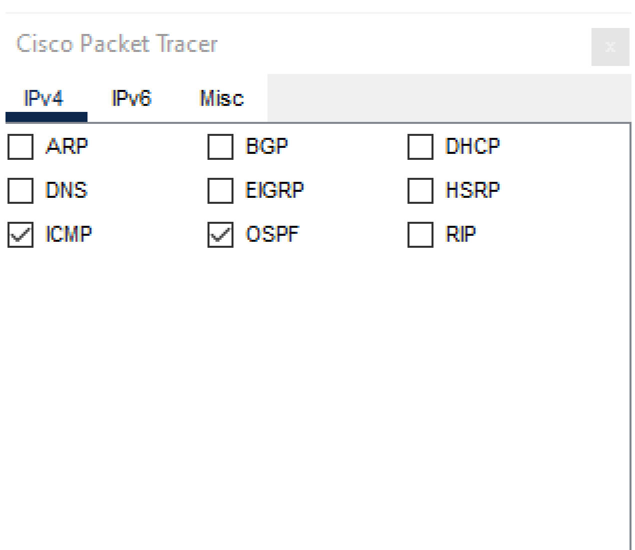

Figure 01: Filter of Simulation Panel.

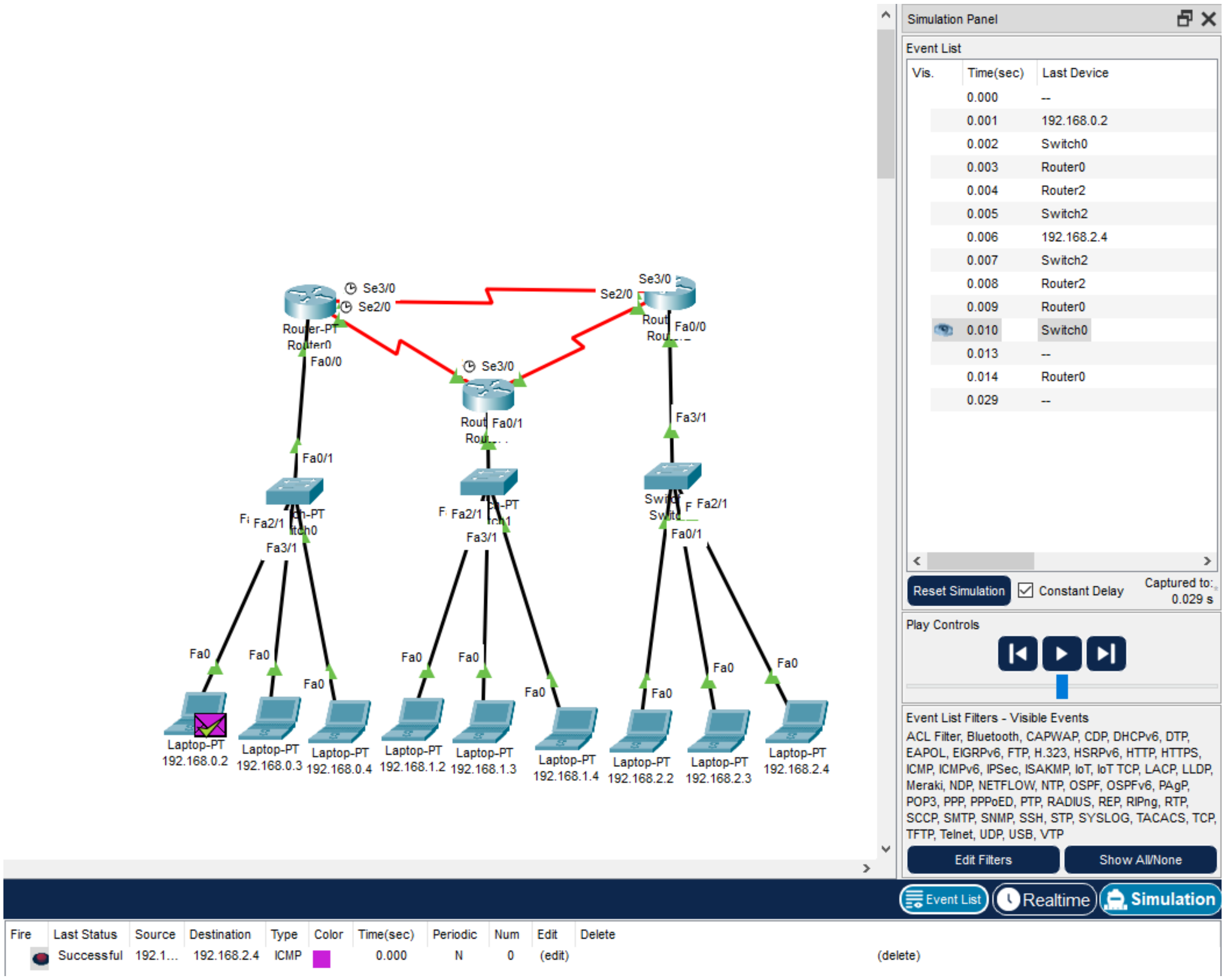

Figure 05: Multi-Router Network using OSPF.

Conclusion:

The **Subnetting using OSPF** experiment successfully demonstrated **dynamic routing** between multiple LANs. Unlike static routing, **OSPF** automatically builds and updates routing tables when the network topology changes. This ensures:

- Automatic route discovery
- Efficient path selection
- High scalability for large networks

The experiment highlights the importance of OSPF in modern enterprise networks, where **scalability, reliability, and automation** are essential.